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VARIATIONS OF THE PAST ATMOSPHERIC CH_4 CONCENTRATION DEDUCED FROM SITE-J ICE CORE, GREENLAND (ABSTRACT)

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Air samples in an ice core from Site-J, Greenland, were analyzed to reconstruct the variations of the atmospheric CH_4 concentration in the northern hemisphere during the last 400 years. The results showed that the CH_4 concentrations were fairly constant during the first 200 years, the values being about 750 ppbv, and then increased significantly. The pre-industrial levels of the CH_4 concentration obtained in this study were higher by 50–60 ppbv than those deduced from the Mizuho core, Antarctica. This implies that natural CH_4 sources were stronger in the northern hemisphere than in the southern hemisphere. Taking account of the fact that the present concentration differences between northern and southern high latitudes are almost 150 ppbv, it is suggested that a large amount of CH_4 has been released into the atmosphere in the northern hemisphere due to anthropogenic activities and/or the atmospheric OH radicals have decreased more rapidly in the northern hemisphere than in the southern hemisphere.

Assuming that the air was well mixed in the firn at Site-J, the age difference between the air in bubbles and surrounding ice was estimated to be about 102 years. It was, however, found that the CH_4 concentrations obtained on the basis of this age difference were delayed in their increase during the last 200 years, as compared with those in southern high latitudes. The cause could be attributed to the insufficient air exchange in the firn due to melt layers. Therefore, the age difference of the Site J ice core was thought to be less than 102 years.

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